

Claims

What is claimed is:

1. Transparent baseboard with conductive multi-layer antireflection films on a transparent substrate,

5 including the transparent substrate, transparent conductive third layer thin film, and transparent dielectric multi-layer thin films in between,

wherein refractive index of said substrate is between 1.48 and 1.70,

and said transparent dielectric multi-layer thin films form first- and second-layer thin films, wherein the first layer has refractive index between 1.50 and 2.50 that is higher than said
10 substrate, and the second-films layer films has index between 1.35 and 1.60 that is lower than said substrate, comprising multi-layer configuration of the first-, the second- and the third-layer thin films whose optical thickness is determined considering the refraction index of said substrate.

2. The transparent baseboard with multi-layer antireflection films as defined in Claim 1,
15 in which the third-layer film has thickness determined with desired surface resistance, and the first- and the second-layer films have thickness determined to keep the theoretical reflection index less than 0.2 from the minimum at the third-layer film taking into account refraction indexes of the substrate and the first- and the second-layer films.

3. The transparent baseboard with multi-layer antireflection films as defined in Claim 1,
20 in which the thickness of the first- and the second-layer films satisfies the theoretical view-sense reflection index less than 1% by adjusting their desired thickness under condition that the thickness of the third-layer film meets the surface resistance requirement.

4. The transparent baseboard with multi-layer antireflection films as defined in Claim 1,
in which the thickness of the first- and the second-layer films satisfies the theoretical view-sense
25 reflection index less than a proper value by varying their desired thickness under condition that the thickness of the third-layer film meets surface electrical resistance requirement.

5. The transparent base board with multi-layer antireflection films as defined in Claim 1,
in which the thickness $n d$ of the first-layer film meets the equation $n d > \lambda/4$.

6. The transparent baseboard with multi-layer antireflection films as defined in Claim 1,
30 in which the thickness of the first-layer film ranges between 10 nm and 600 nm, that of the second-layer film ranges between 10 nm and 600 nm, that of the third-layer film ranges between 20 nm and 300 nm, and a transmission index of these films is no less than 90% at wavelength of 550 nm.

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⁷~~7~~. The transparent baseboard with multi-layer antireflection films as defined in Claim 1, in which the first-layer film consists of mainly ZrO_2 and the second-layer film consists of mainly SiO_2 .

⁸~~8~~. The transparent baseboard with multi-layer antireflection films as defined in Claim 1, in which a transparent dielectric thin film of lower refraction index than that of the substrate is further sandwiched between the first-layer film and the substrate.

⁹~~9~~. The transparent baseboard with multi-layer antireflection films as defined in Claim 1, in which multi-layer films consisting of at least first-, second-, and third-layer films provide surface resistance value between $100 \Omega/\square$ and $5000 \Omega/\square$.

¹⁰~~10~~. The transparent baseboard with multi-layer antireflection films as defined in Claim 1, in which thickness of the first- and the second-layer films is determined using an optimizing algorithm.

¹¹~~11~~. The transparent baseboard with multi-layer antireflection films as defined in Claim 1, in which at least one side of the transparent substrate is undercoated with thickness that almost no optical defect is caused.

¹²~~12~~. The transparent baseboard with multi-layer antireflection films as defined in Claim 1, in which at least one of the first-, the second-, and the third-layer films is deposited with a vacuum evaporation method or a sputtering method.

¹³~~13~~. Transparent touch panel including
a transparent fix substrate with a third thin film of transparent dielectric,
a transparent flexible substrate with a third transparent conductive layer thin film
situated away from said fix substrate,
wherein these conductive third thin films are electrically connected to external circuits,
and at least one of said transparent fix substrate or said transparent flexible substrate has
a refraction index between 1.48 and 1.7,

and multiple layers of dielectric thin films are sandwiched between said transparent fix substrate or said transparent flexible substrate and said third-layer thin film,

comprising the conductive anti-reflection film formed with the manner that firstly said dielectric thin films are laid on the substrate and secondly said third thin film is laid, in which the first-layer transparent thin film has refraction index between 1.50 and 2.50 that is higher than said selected transparent fix substrate and/or flexible transparent substrate, and the second-layer transparent thin film with refraction index between 1.35 and 1.60 that is lower than said selected transparent fix substrate or flexible transparent substrate.

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~~13~~. Transparent touch panel as defined in Claim 14, in which a conductive antireflection film is sandwiched between the transparent fix substrate and the third-layer film, and said conductive antireflection film is made of multi-laid optical thin films that are determined considering the refraction index of the transparent fix substrate.

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~~14~~. Transparent touch panel as defined in Claim 14, in which a conductive antireflection film is sandwiched between the transparent flexible substrate and the third-layer film, and said conductive antireflection film is made of multi-laid optical thin films that are determined considering the refraction index of the transparent flexible substrate.

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~~15~~. Transparent touch panel as defined in Claim 14, in which conductive antireflection films are sandwiched between a transparent flexible substrate and third-layer films, and between transparent fix substrate and third layer-films each, and said conductive antireflection film is made of multi-laid optical thin films that are determined considering the refraction index of said transparent fix substrate.

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~~16~~. Transparent touch panel as defined in Claim 14, in which thickness of the thin film of conductive antireflection third layer is determined to meet the surface electrical resistance requirement, and the thin film thickness of first and second layers is determined to make the theoretical view-sense reflection index within 0.2 from the minimum at the surface of the third layer considering the indexes of the films and fix and/or flexible substrates.

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~~17~~. Transparent touch panel as defined in Claim 14, in which thickness of first and second thin films satisfies theoretical view-sense reflection index less than 1% when their desired thickness is varied as a variable, under condition that the third-layer thickness meets surface electrical resistance requirement.

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~~18~~. Transparent touch panel as defined in Claim 14, in which the thickness of first and second thin films satisfies the theoretical view-sense reflection index less than a proper value by varying their thickness as variables, under condition that the third-layer thickness meets surface electrical resistance requirement.

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~~19~~. Transparent touch panel as defined in Claim 14, in which the thickness n_d of the first layer of said transparent anti-reflection thin film meets the equation $n_d > \lambda/4$.

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~~20~~. Transparent touch panel as defined in Claim 14, in which the thickness of the first thin film ranges between 10 nm and 600 nm, that of the second thin film does between 10 nm and 600 nm, that of the third thin film does between 20 nm and 300 nm, and transmission of these thin films is no less than 90% at wavelength of 550 nm.

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~~21~~. Transparent touch panel as defined in Claim 14, in which the first-layer thin film consists of mainly ZrO_2 and the second-layer film consists of mainly SiO_2 .

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24. Transparent touch panel as defined in Claim 14, in which between said selected transparent fix and/or flexible substrates and said first-layer thin film is further sandwiched a dielectric thin film of lower refraction index than that of said selected transparent fix and/or flexible substrates.

5 ²⁴25. Transparent touch panel as defined in Claim 14, in which at least the antireflection conductive film provides surface electrical resistance ranging between $100 \Omega/\square$ and $5000 \Omega/\square$.

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26. Transparent touch panel as defined in Claim 14, in which the thickness of the first- and the second-layer thin films is determined using an optimizing algorithm.

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10 27. Transparent touch panel as defined in Claim 14, in which at least one side of the transparent fix or flexible substrate is undercoated.

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28. Transparent touch panel as defined in Claim 14, in which a transparent flexible substrate consists of at least laminated 2 sheets of film with glue.

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29. Transparent touch panel as defined in Claim 14, in which the transparent flexible substrate is equipped with a polarized filter sheet.

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30. Transparent touch panel as defined in Claim 14, in which at least one side of the transparent fix or flexible substrate is coated with antireflection film.

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31. Transparent touch panel as defined in Claim 14, in which the transparent flexible substrate is equipped with a polarized filter sheet and with an antireflection film on the sheet.

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32. Electronic equipment including a display furnished with the transparent touch panel as defined in Claim 14 on the display side, and a control circuit that processes control signals obtained by pushing said transparent touch panel.

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